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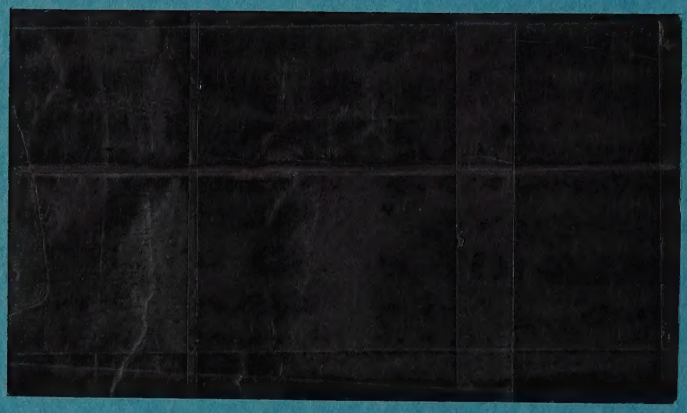
(Oceanographic Research)

C. J. Fish, SUPERVISOR

October 1, 1950 - December 31, 1950

WOODS HOLE, MASSACHUSETTS



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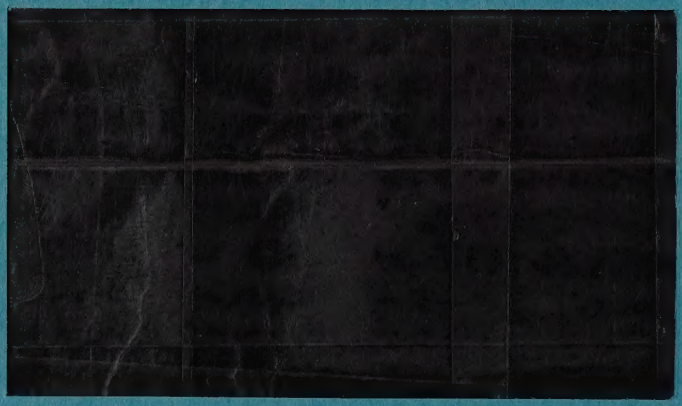

WOODS HOLE OCEANOGRAPHIC INSTITUTION

Woods Hole, Massachusetts

Reference No. 51-4

OCEANIC BIOLOGY
(Oceanographic Research)

C. J. Fish, SUPERVISOR

October 1, 1950 - December 31, 1950

Periodic Status Report
Office of Naval Research
Contract N6-ori-195/TO 1/NR-083-003

January 1951

APPROVED FOR DISTRIBUTION

Director

ABSTRACT

Results of the summer field and laboratory investigations of sonic fishes are now being studied with particular reference to the structure of the sound producing mechanism in each species and its significance. Arrangements are being made for analyses of the recordings with a Harmonic Wave Analyzer, as in the case of those obtained in 1949. Weekly plankton collections from weather stations BAKER and EASY now total 73, obtained on 29 cruises. Five graduate student assistants are engaged in research in biological oceanography. During the past three months 4550 new titles have been added in the Bibliographic Card Index of Atlantic, Pacific and Arctic Oceanography.

RESEARCH

1. Sonic Fish program. An attempt has been made to subject every local species and summer migrant in the Narragansett Bay area, which might be a potential source of underwater sound, to a series of situations, under controlled stimulation, to determine the underlying causes for sound production. For various reasons, the succession of situations could not always be the same, so that experimental and field observations were necessarily distributed through the summer and autumn as specimens became available.

2. During the past quarter a large collection of recordings and associated data have been assembled and are now being studied with particular reference to the structure of the sound producing mechanism in each species and its significance. Until present analyses are completed only a few broad generalizations can be made, as in the manner of producing the sounds there is considerable variation in the reactions of different species.

(a) Some species use sound spontaneously and quite frequently: e.g. in the sea-robin (Prionotus carolinus and P. evolans; maximum pressure 58 and 65 dynes/cm^2, and frequency limits 150-850 and 25-400 cps respectively), sound is produced when the fish is introduced into new surroundings; when strangers are placed in its familiar tank; when fed, annoyed, drawn into competition, or even, apparently, when registering contentment.

(b) In certain cases the season of greatest sound production may be definitely stated. This seems to be true of the noisier species. The squeteague or weakfish (Cynoscion regalis), member of the same family as the croaker (worst offender in southern Atlantic waters), apparently is a negligible noisemaker outside of its breeding season.

The noisy season of the toadfish (Opsanus tau), which remains the most important species in local waters as far as magnitude of sound is concerned (at a distance of 15 feet, maximum pressure 55 dynes/cm^2, and frequency limits 240-380 cps; close to the hydrophone, as high as 250 dynes/cm^2 in the 150 to 300 cps octave), can be still further narrowed to the period between maturation of sex products and actual spawning.

3. The Harmonic Wave Analyzer, previously loaned by Brown University, was recalled before analyses of the 1950 sound recordings could be made. As a replacement could not be located, arrangements are being made to complete the work on the same instrument in Providence. Analyses of the best recordings of each experimental species will be made, with the values comparable with those determined in 1949 (particularly maximum pressure and frequency limits).

4. Weathership Plankton program. The field work at Ocean Stations "E" (35°00'N 48°00'W) and "B" (56°30'N 51°00'W) has been continued successfully. Seventy-six Clarke-Bumpus samples and thirty-six ½-meter net samples have been received from Station "B", and eighty-four Clarke-Bumpus samples and thirty-seven ½-meter net samples have been obtained from Station "E". All of the ½-meter and #2 Clarke-Bumpus net samples from Station "B" have been analyzed, and a report of the first year's results from that position is expected to be completed by May, 1951.

5. At Station "B" a set of three weekly collections and records was made by each of the following vessels during the quarter ending 31 December 1950:

USCGC ROCKAWAY	Sept. 2 - Sept. 23
USCGC CHINCOTEAGUE	Sept. 23 - Oct. 14
USCGC DEXTER	Oct. 14 - Nov. 4
USCGC UNIMAK	Nov. 4 - Nov. 25
USCGC MATAGORDA	Nov. 25 - Dec. 16

At Station "E" similar collections and records were obtained by the following vessels:

USCGC YAKUTAT	Sept. 13 - Oct. 4
USCGC ABSECON	Oct. 4 - Oct. 25
USCGC COOK INLET	Oct. 25 - Nov. 15
USCGC SPENCER	Nov. 15 - Dec. 6
USCGC BIBB	Dec. 6 - Dec. 27

6. To date there have been 29 cruises and a total of 73 weekly plankton stations completed. Nansen bottle samples from both stations continue to be assigned to Dr. Gordon Riley for phytoplankton study. Analysis of the zooplankton and oceanographic data from Stations "E" and "B" is being carried out by Dr. Charles J. Fish and Mr. William V. Kielhorn.

7. As insurance against interruption of observations in the event of damage or loss of instruments at sea, five additional cases, each containing a spare C-B sampler and Nansen Bottle are being assembled. When ready one of these will be added in each set of vessel equipment now in use.

TRAINING

8. The five graduate student assistants in biological oceanography are continuing work on their theses which will be submitted as Technical Reports when completed. Following are the subjects and assignees:

Outline of Doctorate Thesis Problem. Brown University

(a) The Biology of the Zooplankton Population of the Narragansett Bay Region. Herbert T. Frolander. Work in progress at Narragansett Marine Laboratory.

Objectives: A determination of the annual cycle of changes in the size and composition of the neritic zooplankton population. The study has been designed to reveal augmentation periods of the component species, development rates, depletion rates and frequency of replacement (number of generations) during the production season or seasons. An attempt will be made to correlate zooplankton productivity with physical environmental factors.

Outline of Masters Thesis Problems. Rhode Island State College.

(b) The Biology of the Surface Zooplankton Population of a Boreo-Arctic Atlantic Ocean Area. William V. Kielhorn. Work in progress at Narragansett Marine Laboratory.

Objectives: A determination of seasonal progression of the zooplankton population in the high seas beyond the immediate influence of the coast, the magnitude and character of these changes, augmentation seasons, the extent to which the population is locally produced, and correlation, so far as possible, with physical environmental factors and phytoplankton production.

(c) Bacteria-Plankton Relationships. George Moskovits. Work in progress at the Woods Hole Oceanographic Institution.

Objectives: To study, both qualitatively and quantitatively the bacteria associated with the marine zoo- and phytoplankton of certain northern temperate neritic waters.

(d) A Study of the Populations of Polynices duplicata and P. heros in Narragansett Bay and the Waters Surrounding Cape Cod, with Special Attention to Relative Population Densities and Limits, and Ecological Conditions Relating to these Factors. David B. Sawyer. Work in progress at the Woods Hole Oceanographic Institution.

Objectives: A comparison of the two major areas, with reference to relative growth rates, size, age and density of the populations, and correlation between the effect of ecological conditions on the above characteristics in the two groups.

(e) The Herring of Long Island Sound. Howard L. Sanders. Work in progress at the Bingham Oceanographic Laboratory.

Objectives: To determine what race or races make up the shoals of herring, what age groups enter the Sound, whether this is a spawning migration or one in search of food, what organisms serve as food, and whether these fish are selective in their feeding in regard to species and size.

BIBLIOGRAPHIC CARD INDEX

9. During the past quarter, Mary Curtis Cobb, working at Woods Hole, has indexed approximately 4000 titles for the Atlantic Bibliography of Oceanography, 400 for the Arctic and 150 new Pacific title references. The three indexes are being maintained up to date by weekly coverage of all pertinent accessions received by the Marine Biological Laboratory.

PERSONNEL

10.

Name	Title	Total Man Days*
Charles J. Fish	Senior Biologist, in charge (Quarter time)	16.25
Marie P. Fish	Associate Biologist	65.00
Mary C. Cobb	Secretary-Technician	65.00
Robert Campbell	Biological Aid	65.00
	Temporary assistants	5.75
	Graduate student assistants (5)	174.5
	Total Man Days	391.50

*Man day consists of 8 working hours.

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